Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at http://about.jstor.org/participate-jstor/individuals/early-journal-content.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

now be of great interest to secure satisfactory specimens of this plant, in order that the doubt concerning its classification might be set at rest.

Announcement of the A. A. A. S. Committee on a Botanical Exchange.

To the Members of the Botanical Club of the A. A. A. S.:

Your committee, appointed in August last to devise a method for the exchange of specimens among American botanists, have, after consultation with other botanists, decided that the most practical method is through the herbarium of the Department of Agriculture, at Washington.

A classified stock of duplicates belonging to the Department is available as a basis of an exchange herbarium.

Those desiring to exchange specimens should address, for rules and other information, Dr. Geo. Vasey, U. S. Department of Agriculture, Washington, D. C.

GEO. VASEY, N. L. BRITTON,
SERENO WATSON, B. D. HALSTED,
THOMAS MORONG, Committee.

Reviews of Foreign Literature.

Experimentelle Untersuchung über das Wachsthum der Zellmembran. By F. Noll. (Abhandlung der Senckenbergerischen Naturforschenden Gesellschaft, Bd. xv, 1887.)

A short review of this paper, describing some interesting experiments in respect to the manner of growth of cell membrane, is given in the Centralblatt, Vol. 33, No. 4, 1888. The following is a brief abstract of the review:

The author first gives a historical sketch of the opinions held, at different times, of the manner of growth of the cell membrane. The first generally adopted theory was that of growth by apposition. Naegeli, in his work on starch grains, almost entirely overthrew this theory, establishing in its place that of intussusception. Gradually doubts arose regarding this mode of growth and the opposition theory gained new adherents, until at the present time the two theories stand opposed to each other, and the question is left for future investigators to decide.

The author undertakes to solve the question experimentally, by causing a difference in color between the old and new growth of membrane. As the new membrane will not take up aniline or similar coloring stuff, the old membrane was colored and the new left colorless. The method used has already been successful in solving questions in animal physiology. Living specimens were colored with either Prussian or Turnbull's blue. The plants experimented with were sea Algæ, mostly from the family Siphonaceæ, such as *Caulerpa*, *Derbesia* and *Bryopsis*, obtained at the zoölogical station at Naples.

The method of coloring consisted in putting the plants for a few seconds into a solution of potassium-ferrocyanide, then rinsing well in sea-water, then dropping them for an instant only into a freshly prepared solution of ferric chloride. This process was repeated till the plants assumed a light blue color.

In order to prove what effect this might have on the life energies of the plants so treated, colored specimens were compared with uncolored ones. No difference could be detected between the two classes as to rapidity of growth, motion of protoplasm, or form assumed by growing parts. The cell membrane was colored uniformly; the cuticularized layer a dark blue, the cellulose a lighter color.

This color disappears in living plants after a few hours, but may be called back again by putting them into a solution of potassium-ferrocyanide, acidified with pure hydrochloric acid. That the coloring process had produced no change in the qualities of the membrane was shown, in that no change could be detected in form, elasticity, ductility, etc. The ability to assume other forms, wood, cutin, etc., was not changed.

By watching the disposition of the new particles as the new uncolored membrane was formed, the author believes to have proven beyond controversy that in these sea Algæ, both apical growth and growth in thickness of wall takes place by apposition.

By apical growth is meant here the extension of a wall at the extremity of a cell, by which means the cell is lengthened in that direction. He says this growth takes place as follows: "When the colored plants grow on farther, the points of the young shoots break through the old colored membrane." That is, the old membrane grows thinner at that point or surface where the new is to appear, a new colorless membrane is laid on by apposition, grows gradually thicker, while the old grows thinner, the original thickness being thus preserved till at last, the old membrane bursts and the new grows on. This, he says, is the so-called eruption growth, the old membrane having burst, the young shoot is built out of entirely new material.

In a similar manner the growth of the cell wall in thickness proceeds, by new layers added on to the old blue membrane. As these new layers were added it was proven that foreign substances, like balls of dead protoplasm, could be enclosed in the cellulose of the wall, and the author believes this to be the origin of the nitrogen supposed by Wiesner to be an essential part of the wall.

The increase of the wall in surface, so far as it is not brought about by the apical growth referred to above, is said to take place by means of the stretching rendered possible by the influence of the protoplasm; this extension, he says, is not as great, however, as Naegeli affirms.

The growth of the leaf-like organs of *Caulerpa* takes place by new pieces of membrane, periodically breaking through the upper edge of the old. Occasionally the point of vegetation was seen to divide and two leaflets were formed, whose junction he supposed might be the place where the reproductive organs were formed.

These observations were particularly well confirmed in the nearly transparent structures of *Bryopsis* and *Derbesia*, while exact measurements showed that no supplementary increase of the thickness of the blue zone had appeared, or, what is the same, that no growth by intussusception had taken place at the same time apposition was going on. That this was not due to the iron in the coloring matter was proven by comparison with uncolored plants.

The manner of origin of the new layers is represented by the author in the following manner: The outer layer of protoplasm becomes gradually more and more laden with particles of carbohydrates, while the proteid matters retreat from the outside, until at last, instead of the outer layer of protoplasm, a cellulose lamella is formed, which sits firmly upon the old wall. This is, indeed, a process of intussusception, but it takes place in particles of living protoplasm and not in those of a dead wall.

Some examples are given of membranes which do not appear to be a regular formation, but occurring now and then. Such are partition walls occurring with no dependence upon division of nucleus, also the threads or beams (balken), as they are called in German, which are thrown across from wall to wall, apparently as supports. These appear first as protoplasm strings, and are afterward transformed into cellulose. *Caulerpa* is not the example referred to.

Other plants submitted to this test were *Codium tomentosum* and *C. Bursa*, *Dasycladus clavæformis*, *Udothea cyathiformis*, *Polysiphonia variegata* and a few out of the Cladophoraceæ, all of which gave similar results as to the question of apposition.

The author concludes from these results that, in general, the growth of cell membrane depends on apposition, and that there remains no longer any direct proof of growth by intussusception.

Not having access to the original article, it is impossible to determine from the review just what the author means in reference to the manner of growth in surface of a cell wall after the foundations are once laid. This is one great difficulty in the apposition theory, which offers no satisfactory explanation of the phenomenon called surface growth, that is, growth in the other two dimensions before growth in thickness begins. The only reference to this point is the one quoted, in which the author refers such growth to the stretching of the wall caused by the influence of the protoplasm. Also at the end of the review it is stated that the author believes with Sachs and de Vries that all growth is dependent upon turgor, and holds Krabbe's view essentially wrong; further, that the acceptation of turgor as the necessary condition to growth excludes the necessity of the notion of growth by intussusception.

How this excludes such necessity is not made clear in the review. Neither does it appear by this experiment that growth by intussusception is, with absolute certainty, disproved in the case of surface growth. For allowing that it does take place, that new uncolored particles of cellulose are shoved in between the old colored particles, the only visible effect of this would be to render the color of the old membrane lighter blue and it seems this is exactly what does take place of itself, as he states, in living plants—the color fades in a few hours.

There is also one other point of interest not referred to, that is, the manner of growth in the "balken" of Caulerpa. This seems especially desirable to determine, inasmuch as it has been made the means of supporting both theories, first by Naegeli, as proving intussusception, afterward by Strasburger, as evidence of the opposite theory. It would seem that the test of coloring the old membrane might have thrown light on this question, but the author expressly states Caulerpa was not the plant in which the origin of the balken was traced.

It is quite possible the weight of these remarks would be removed by a perusal of the original, and their only excuse is, the interest awakened in the old question by these experiments, and the hope that the same or similar methods may be of use in helping to a knowledge of the mystery of the manner of growth of the cell wall. E. L. G.

Index to Recent American Botanical Literature.

Agarics of the United States.—Genus Panus.—Edward J. Forster. (Journ. Mycol., iv., pp. 21-26.) Fourteen species described.

Aquilegia longissima, Gray. (Garden and Forest, i., p. 31, fig. 6.)

Archæan Plant from the White Crystalline Limestones of Sussex County, New Jersey.—N. L. Britton. (Annals N. Y. Acad. Sci., iv., pp. 123, 124, plate vii.; reprinted.)

Asa Gray. Among the many memorials which have been published, the following are worthy of record:

"In Memoriam," containing the funeral services as held in Appleton Chapel, Harvard College, Feb. 12, 1888 (pamphlet 8vo, 49 pages, Cambridge University Press); "Asa Gray, 1810-1888," by Prof. J. D. Dana (Am. Journ. Sci., xxxv., pp. 181-202, reprinted); and reviews by J. D. Hooker (Nature, xxxvii., pp. 375-377), C. S. Sargent (Garden and Forest, i., Nos. 1 and 2, accompanied by a fine photogravure reproduction of the St. Gauden's bronze medallion), W. G. Farlow (Bot. Gaz., xiii., pp. 49-52), Thos. Meehan (The American Garden, ix., p. 100), Edson S. Bastin (Western Druggist, x., p. 42, with portrait), Fr. Hoffman (Pharm. Rundsch., vi., pp. 49-56, with portrait and chronological list of works), M. T. Masters (Gardeners' Chronicle, iii., p.